Broccoli

Broccoli is an edible green plant in the cabbage family (family Brassicaceae, genus *Brassica*) whose large flowering head and stalk is eaten as a vegetable. The word *broccoli* comes from the Italian plural of *broccolo*, which means "the flowering crest of a cabbage", and is the diminutive form of *brocco*, meaning "small nail" or "sprout".[3]

Broccoli is classified in the Italica cultivar group of the species *Brassica oleracea*. Broccoli has large flower heads, usually dark green in color, arranged in a tree-like structure branching out from a thick stalk which is usually light green. The mass of flower heads is surrounded by leaves. Broccoli resembles cauliflower, which is a different cultivar group of the same *Brassica* species. Combined in 2017, China and India produced 73% of the world's broccoli and cauliflower crops.[4]

Broccoli

Species	*Brassica oleracea*
Cultivar group	italica
Origin	Italy, more than 2,000 years ago[1][2]

Broccoli resulted from breeding of cultivated *Brassica* crops in the northern Mediterranean starting in about the sixth century BC.[5] Since the time of the Roman Empire, broccoli has been commonly consumed,[6] and is eaten raw or cooked. Broccoli is a particularly rich source of vitamin C and vitamin K. Contents of its characteristic sulfur-containing glucosinolate compounds, isothiocyanates and sulforaphane, are diminished by boiling, but are better preserved by steaming, microwaving or stir-frying.[7]

Rapini, sometimes called "broccoli raab" among other names, forms similar but smaller heads, and is actually a type of turnip (*Brassica rapa*).

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Other cultivar groups of *Brassica oleracea*

Other cultivar groups of *Brassica oleracea* include cabbage (Capitata Group), cauliflower and Romanesco broccoli (Botrytis Group), kale and collard (Acephala Group), kohlrabi (Gongylodes Group), Brussels sprouts (Gemmifera Group), and kai-lan (Alboglabra Group).[8] Broccolini or "Tenderstem broccoli" is a cross between broccoli and Chinese broccoli.

Broccoli plants in a nursery

Varieties

There are three commonly grown types of broccoli. The most familiar is **Calabrese broccoli**, often referred to simply as "broccoli", named after Calabria in Italy. It has large (10 to 20 cm) green heads and thick stalks. It is a cool season annual crop. **Sprouting broccoli** has a larger number of heads with many thin stalks. **Purple cauliflower** is a type of broccoli grown in Europe and North America. It has a head shaped like cauliflower, but consisting of tiny flower buds. It sometimes, but not always, has a purple cast to the tips of the flower buds.

Close-ups of broccoli florets (click to enlarge)

Other popular cultivars include Belstar, Blue Wind, Coronado Crown, Destiny, DiCicco, Green Goliath, Green Magic, Purple Sprouting, Romanesco, Sun King and Waltham 29.[9]

Beneforté is a variety of broccoli containing 2–3 times more glucoraphanin that was produced by crossing broccoli with a wild Brassica variety, *Brassica oleracea* var *villosa*.

Production

In 2017, global production of broccoli (combined for production reports with cauliflowers) was 26.0 million tonnes, with China and India together accounting for 73% of the world total.[4] Secondary producers, each having about one million tonnes or less annually, were the United States, Spain, Mexico and Italy.

In the United States, broccoli is grown year-round in California – which produces 92% of the crop nationally – with 95% of the total crop produced for fresh sales.[10]

Cultivation

The majority of broccoli cultivars are cool-weather crops that do poorly in hot summer weather. Broccoli grows best when exposed to an average daily temperature between 18 and 23 °C (64 and 73 °F).[11] When the cluster of flowers, also referred to as a "head" of broccoli, appear in the center of the plant, the cluster is generally green. Garden pruners or shears are used to cut the head about an inch from the tip. Broccoli should be harvested before the flowers on the head bloom bright yellow.[12]

Pests

Mostly introduced by accident to North America, Australia and New Zealand, "cabbage worms", the larvae of *Pieris rapae*, the small white butterfly are a common pest in broccoli.[13]

Nutrition

A 100 gram reference serving of raw broccoli provides 34 calories and is a rich source (20% or higher of the Daily Value, DV) of vitamin C (107% DV) and vitamin K (97% DV) (table). Raw broccoli also contains moderate amounts (10–19% DV) of several B vitamins and the dietary mineral manganese, whereas other micronutrients are low in content (less than 10% DV). Raw broccoli is 89% water, 7% carbohydrates, 3% protein, and contains negligible fat (table).

Broccoli production — 2017
(includes cauliflower)

Country	Production millions of tonnes
China	10.4
India	8.6
United States	1.3
Spain	0.7
Mexico	0.7
Italy	0.4
World	**26.0**

Source: FAOSTAT of the United Nations[4]

Cooking

Boiling substantially reduces the levels of broccoli glucosinolates, while other cooking methods, such as steaming, microwaving, and stir frying, have no significant effect on glucosinolate levels.[7]

Broccoli, raw (edible parts)

Nutritional value per 100 g (3.5 oz)		
Energy	141 kJ (34 kcal)	
Carbohydrates	6.64 g	
Sugars	1.7 g	
Dietary fiber	2.6 g	
Fat	0.37 g	
Protein	2.82 g	
Vitamins	**Quantity**	**%DV†**
Vitamin A equiv.	31 µg	4%
beta-Carotene	361 µg	3%
lutein zeaxanthin	1403 µg	
Thiamine (B_1)	0.071 mg	6%
Riboflavin (B_2)	0.117 mg	10%
Niacin (B_3)	0.639 mg	4%
Pantothenic acid (B_5)	0.573 mg	11%
Vitamin B_6	0.175 mg	13%
Folate (B_9)	63 µg	16%
Choline	19 mg	4%
Vitamin C	89.2 mg	107%
Vitamin E	0.78 mg	5%
Vitamin K	101.6 µg	97%
Minerals	**Quantity**	**%DV†**
Calcium	47 mg	5%
Iron	0.73 mg	6%
Magnesium	21 mg	6%
Manganese	0.21 mg	10%
Phosphorus	66 mg	9%
Potassium	316 mg	7%
Sodium	33 mg	2%

Taste

The perceived bitterness of cruciferous vegetables such as broccoli varies from person to person, but the functional underpinnings of this variation are not known. Some research reports that the gene TAS2R38 may be responsible for bitter taste perception in broccoli.[14] Other factors, such as isothiocyanates and polyphenols, are also likely involved in bitterness perception.[15] In some varieties the normally bitter tasting compounds are in less volatile forms.

Gallery

Furrow flood irrigation on a field of broccoli raised for seed in Yuma, Arizona.

Zinc	0.41 mg	4%
Other constituents	**Quantity**	
Water	89.3 g	

Link to USDA Database entry (https://ndb.nal.usda.gov/ndb/search/list?qlookup=11090&format=Full)

Units

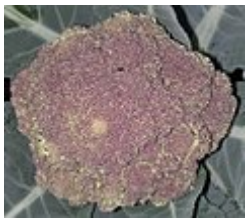
μg = micrograms • mg = milligrams

IU = International units

†Percentages are roughly approximated using US recommendations for adults.

Source: USDA Nutrient Database (https://fdc.nal.usda.gov/index.html)

Broccoli in flower



Sicilian purple broccoli

Broccoli "giant", whose flowering head and stalk can reach a kilo.

See also

- Broccolini
- Agriculture portal
- Food portal

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External links

- PROTAbase on *Brassica oleracea (cauliflower and broccoli)* (https://web.archive.org/web/20160210161136/http://database.prota.org/dbtw-wpd/exec/dbtwpub.dll?AC=QBE_QUERY&BU=http%3A%2F%2Fdatabase.prota.org%2Fsearch.htm&TN=PROTAB~1&QB0=AND&QF0=Species+Code&QI0=Brassica+oleracea+cauliflower+and+broccoli&RF=Webdisplay)
- List of North American broccoli cultivars (http://cuke.hort.ncsu.edu/cucurbit/wehner/vegcult/broccoli.html), USDA/ARS Vegetable Laboratory
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